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SCAR HETEROGENEITY ON CARDIAC MAGNETIC RESONANCE IMAGING IS A PREDICTOR OF APPROPRIATE IMPLANTABLE CARDIOVERTER DEFIBRILLATOR THERAPY: 10 YEARS OF EXPERIENCE

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Background: Sudden cardiac death (SCD) due to ventricular arrhythmia remains a common cause of death. Several studies have demonstrated a survival benefit with implantable cardioverter-defibrillator (ICD). Unfortunately, a majority of patients receiving an ICD for primary prevention fail to utilize the device. Therefore, identification of patients who will receive appropriate ICD therapy has substantial impact. In this study, we sought to determine if heterogeneous scar area (HSA) identified by late gadolinium enhancement cardiac magnetic resonance (LGE-CMR) could predict appropriate ICD therapy.

Methods: From 2001 to 2010, all patients who underwent ICD implantation at our institution for primary or secondary SCD prevention and had a pre-implantation LGE-CMR were identified. Scar size was determined using threshold of 4 or 6 standard deviation (SD) above the mean of the remote normal myocardium and by manual tracing; HSA was defined as difference between 2 SD and 4 SD (HSA2-4SD) and between 4SD and 6SD (HSA4-6SD). The primary end-point was ICD therapy (appropriate shock and/or anti-tachycardia pacing).

Results: Of 84 patients (52 primary; 32 secondary), appropriate ICD therapy occurred in 25(30%) over a mean of 35±30 mo (9 primary; 16 secondary). Scar size and HSA were analyzed in 59 patients (41primary; 18 secondary). Scar size by 4 SD, 6 SD or manual tracing was not associated with survival free of appropriate ICD therapy in primary or secondary groups. There was no significant association between HSA and survival free of appropriate ICD therapy in the secondary prevention group. However, in the primary prevention group, survival free of appropriate ICD therapy was significantly longer in patients with smaller HSA2-4SD ($P<0.001$) and HSA4-6SD ($P<0.05$). Female gender and higher LVEF were also associated with improved survival. Multivariate analysis found that only HSA2-4SD had a significant impact on survival free of appropriate ICD therapy.

Conclusions: In primary prevention ICD implantation, HSA as measured by LGE-CMR can identify patients with appropriate ICD therapy. If confirmed in larger series, HSA can be used as a predictor for better risk stratification in primary prevention of SCD.